

**Clarifying the Relationships among Ecosystem Based Management;
Integrated Ecosystem Assessments; and, Coastal and Marine Spatial Planning:
-- NOAA Response to SAB/ESMWG Letter of April 5, 2010 --
*March 2, 2011***

Background

The Administration's recent release of the new National Ocean Policy (NOP) and Framework for Effective Coastal and Marine Spatial Planning establishes an expectation and a coordination infrastructure for a more comprehensive, integrated approach to the sustainable, place-based management of the nation's oceans, resources and uses. On April 5, 2010, the Science Advisory Board's (SAB) Ecosystem Science and Management Working Group (ESMWG) requested clarification of the functional and organizational relationships among three major NOAA efforts that will contribute to the agency's implementation of the NOP: (i) Ecosystem-based Management (EBM); (ii) Integrated Ecosystem Assessments (IEAs); and (iii) Coastal and Marine Spatial Planning (CMSP).

This NOAA document responds to the SAB's overarching question about how and for what purpose EBM, IEAs and CMSP intersect. To that end, it: (i) defines each effort; (ii) summarizes their overall focus and impacts and the key functional linkages among them; (iii) describes NOAA's actions to integrate and advance these efforts from planning to implementation across the agency; (iv) proposes potential next steps to strengthen these efforts; and (v) responds to specific detailed questions not addressed in the previous sections (in Appendices).

Working Definitions of EBM, IEAs and CMSP

Following are the working definitions NOAA uses for each of the three efforts. Specific details of their implementation may vary within these broad guidelines depending on regional needs, capacities or processes.

Ecosystem-based Management (EBM) NOAA strives to adopt an ecosystem-based approach throughout its broad ocean and coastal stewardship, science, and service programs. NOAA's approach to EBM reflects the widely accepted definition of marine EBM contained in a consensus statement of 217 international scientists (McLeod et. al. 2005).

"Ecosystem-based Management is an integrated approach to management that considers the entire ecosystem, including humans. The goal of ecosystem-based management is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need. Ecosystem-based management differs from current approaches that usually focus on a single species, sector, activity or concern; it considers cumulative impacts of different sectors. Specifically, ecosystem-based management:

- emphasizes the protection of ecosystem structure, functioning and key processes;
- is place-based in focusing on a specific ecosystem and the range of activities affecting it;
- explicitly accounts for the interconnectedness within systems, recognizing the importance of interactions between many target species or key services and other non-target species;

- acknowledges interconnectedness among systems, such as between air, land and sea; and
- integrates ecological, social, economic, and institutional perspectives, recognizing their strong interdependences.”

Integrated Ecosystem Assessments (IEAs) NOAA defines IEAs as “a synthesis and quantitative analysis of information on relevant physical, chemical, ecological and human processes in relation to specified ecosystem management objectives”. Integrated Ecosystem Assessments, as NOAA defines them, provide a process to work closely with stakeholders and managers to identify priority management issues and provide robust decision-support information. IEAs integrate diverse ecosystem data, including socio-economic information, to analyze ecosystem and community status relative to a defined issue and then predict future status based on forecasts of natural ecosystem variability coupled with evaluation of alternate management strategies. Through this process the benefits and risks to social and ecological sectors – the tradeoffs – of alternate management actions are evaluated and defined to inform stakeholders and managers in their decisions. Through continued evaluation of performance, the IEA process allows adaptive management. (For additional detail, see the sister response to the SAB on IEAs)

Coastal and Marine Spatial Planning (CMSP) NOAA’s approach to CMSP mirrors that outlined in the National Ocean Policy and Framework for Effective Coastal and Marine Spatial Planning (*Final Recommendations of the Ocean Policy Task Force, July 2010*).

“Coastal and marine spatial planning is a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas. Coastal and marine spatial planning identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives. In practical terms, CMSP provides a public policy process for society to better determine how the ocean, coasts, and Great Lakes are sustainably used and protected - now and for future generations.”

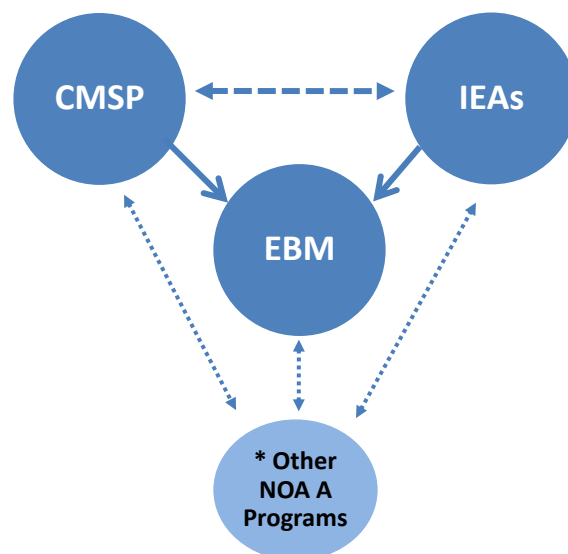
Functional Relationships among EBM, IEA, and CMSP

Ecosystem-based management is fundamental to NOAA’s agency-wide approach to managing coastal and ocean resources. Valued ecosystem services – the currency of EBM – are sustained by a variety of tools and approaches, including CMSP and IEAs. Taken together, EBM, IEAs and CMSP bring science, planning and action together in unprecedented ways. Central to this approach are two underlying relationships:

1. EBM is the *unifying principle and way of doing business* by which NOAA implements its strategic goals and objectives to enhance the sustainability of valued ecosystem services and the overall health, resilience and productivity of our nation’s coasts and oceans.
2. IEAs and CMSP are, respectively, an *analytical tool and a public planning process* that, along with other relevant NOAA scientific and resource management capabilities, can inform and advance EBM across NOAA’s broad stewardship mandates.

Created in response to the SAB's specific inquiry, the simplified graphic below illustrates how, when pursued together, IEAs, CMSP and EBM provide an integrated approach to comprehensive, place-based ocean management in the U.S. To that end, IEAs and CMSP are depicted as complementary science-based tools and processes contributing in various ways to the overarching approach of EBM, with all three advancing the sustainability of valued ecosystem services. It is important to note that this figure was developed primarily to address the SAB's direct question about the relationships among EBM, IEAs and CMSP. Consequently, the graphic, and associated text, acknowledges but does not expand upon the many significant contributions made by other NOAA science and management programs (indicated by the "*").

Sustaining Ecosystem Services: EBM, CMSP and IEAs Working Together



By design, each of these three NOAA efforts – EBM, CMSP, IEAs contributes to or is informed by the others in various ways. Key aspects of these *pair-wise linkages* include:

IEAs and EBM – As an analytical engine for EBM, IEAs inform decision-making and adaptive management of our oceans and coasts. They bring scientific and technological rigor to resource management decisions by incorporating diverse sources of data into ecosystem models that evaluate trade-offs among management decisions related to competing objectives. Based on discrete, and often sectoral, management objectives, IEAs provide managers and stakeholders options for achieving the ecosystem goals.

CMSP and EBM – CMSP provides regional planners and stakeholders with a science-based, transparent means of matching emerging human uses to appropriate ocean and coastal areas in ways that minimize conflicts and impacts, while ensuring sustainable benefits. Built on a foundation of sustaining ecosystem services, CMSP represents a public planning process for

achieving the goals of EBM with increased efficiency through rational, objective spatial planning for future sustainable uses.

IEAs and CMSP – The regional CMSP process outlined in the National Framework for Effective CMSP calls for analytical products and decision support services provided by IEAs. Depending on the information needs identified by the federal, state and tribal members of the Regional Planning Bodies, IEAs, could support regional CMS planning in several potential ways, including:

- ~ Contributing data and analytical products to fill specific needs in discrete phases of the overall process (e.g. analysis of ecosystem status and trends, forecast of future scenarios, emerging threats, etc)
- ~ Informing sectoral planning, management and evaluation during the long-term implementation of the comprehensive regional CMS plan by managing agencies using their existing authorities and processes to execute parts of the overall plan (e.g. fisheries management, sanctuaries designations, protected species habitats, etc.)

Combined, these three efforts bring together science and analysis (IEAs), comprehensive regional planning (CMSP), and, integrated management (EBM), with each contributing to sustaining valued ecosystem services. The SAB letter highlights the overlap among these three efforts. While sometimes a source of confusion, their commonalities in purpose and terminology reflect a solid, integrated foundation to advance NOAA-wide stewardship goals.

Making It Real: Moving from Planning to Implementation

The National Ocean Policy creates a clear mandate to move forward in the development and implementation of EBM and CMSP, and highlights the value of IEAs to inform both. NOAA is poised to meet this historic challenge. In response to the SAB's inquiry, this document describes how IEAs, CMSP and EBM can combine to sustain ecosystem services. Linking these three approaches from planning to implementation will be crucial to advancing NOAA's strategic goals and objectives.

It is also important to note that IEAs and CMSP are by no means the only EBM-related activities in NOAA. Clearly, NOAA has diverse and robust ecosystem management responsibilities, programs and partners that can contribute to, and benefit from, IEAs and CMSP. Examples include place-based management programs (e.g. national marine sanctuaries, protected resources conservation, coastal zone management) and an unparalleled suite of science and technical capacities including: prediction and forecasting, observing systems, and advanced ecosystem modeling.

IEAs and CMSP are relatively new formal programs designed to work across the agency and our external partners to leverage existing capabilities toward a science and management framework for EBM. Together, IEAs, CMSP and EBM leverage other available research, modeling, and management expertise and activities ongoing in the agency as well as from federal and non-federal NOAA partners. Following are some examples of how NOAA is actively moving to advance the linkages and combined impacts of EBM, IEAs and CMSP.

NOAA-wide Integration The NOP envisions a new way of doing business in ocean management: one which depends upon dramatically improved integration and cohesion, both among and within agencies, and between headquarters and regional efforts. To that end, NOAA has repurposed its NOAA Ocean and Coastal Council (NOCC) to serve a critical leadership role by integrating across the entire agency and at all geographic scales, major initiatives (such as EBM, IEAs, and CMSP) toward the 9 priority objectives contained in the NOP. The NOCC meets regularly with the aim of enhancing integration and leveraging independent programmatic efforts toward common goals. EBM, IEAs and CMSP are central to that effort and are actively being integrated now through the NOCC's guidance and oversight. Staff from each program interact regularly and are engaged in coordinated planning for regional pilot projects.

NOAA-wide Strategic Planning Guided by the Next Generation Strategic (NGSP) and Administrator's Annual Guidance Memorandum (AGM), NOAA's new budget planning process (Strategy, Execution, and Evaluation or SEE), ensures a direct link between high level concepts like EBM, IEAs and CMSP, and the practical allocation of people, resources and attention to implement them. NGSP implementation plans provide the framework for NOAA's contribution to achieving sustained ecosystem services. The NGSP also provides an enterprise level objective for Science and Technology critical to EBM: a holistic understanding of the Earth System through research; accurate and reliable data from sustained and integrated Earth observing systems; and an integrated environmental modeling system; and socio-economic research.

NOAA-wide Capacity Building Each of these initiatives, and particularly the IEA and CMSP efforts, has undergone targeted program development over the past few years.

IEAs have a dedicated program staff at NOAA Headquarters that are working to support and coordinate the development and implementation of IEA programs in several initial regions. Cross Line Office teams have been established in these regions (e.g. California Current, Gulf of Mexico) and work is being conducted to build the underlying frameworks and move these IEA efforts forward in a consistent but regionally specific fashion.

Based on the recommendations of an internal planning process during FY10, NOAA has recently established a small CMSP Program to coordinate and support its implementation of the NOP and CMSP Framework. Built around a small nucleus of core staff augmented by fellows and detailees, the CMSP Program interacts with 9 regional CMSP coordinators, 5 expert theme teams, and a cross-Line Office Program Implementation Council.

Within NOAA, the IEA and CMSP programs are working closely together to determine how these two efforts will best intersect and support not only each other, but NOAA's and the Nation's goal to adopt ecosystem-based management of our trust resources.

Potential Next Steps

Based on input from the SAB's ESMWG, NOAA will consider several potential next steps to enhance the impact and integration of its complementary EBM, IEA and CMSP initiatives. They include:

Internal NOAA Integration As the CMSP and IEA national program staff and regional coordinators will continue to work closely together, as well as with broader NOAA planning for EBM. Further, NOAA's CMSP Program will task its new Ecosystems Theme Team, and the NOCC EBM Priority Objective Team, with exploring ways to strengthen the linkages among IEAs, CMSP and EBM and specifically to ensure active engagement by all relevant contributing programs. To this end, NOAA will produce an organizational chart that maps staff to each of the three efforts.

Web Site In response to the ESMWG's recommendation for an "ecosystem.gov" website, NOAA will explore various options. For example, this page could build off of the former NOAA Ecosystem Goal Team website and link to the NOAA CMSP and IEA websites. Once in place, other agencies and institutes could be given the opportunity to participate. Criteria will have to be developed for what is relevant and appropriate content. It could also link to other known EBM related efforts' pages such as the West Coast EBM Network, EBM Tools Network, MEAM, HD.gov (HumanDimensions.gov).

Constituent Outreach Through regional NOAA IEA and CMSP teams, the two efforts will work to inform and engage constituents either as users or as contributors to the initiatives. This will be an ongoing, long-term process and will likely vary from region to region, and over time. This will be done through a variety of methods – either through stakeholder/ scoping processes, involvement and participation with management councils (e.g. Fisheries Management Councils, Coastal Zone Management groups, Energy groups, etc.), presentations at professional venues (e.g. conferences, workshops); fact sheets; program publications (e.g. regional ecosystem status reports, peer-reviewed literature).

Conclusion

We very much appreciate the support, interest and thoughtful expert advice that the Science Advisory Board's Ecosystem Science and Management Working Group has generously provided to NOAA, and look forward to building upon these ideas in the coming years.

Appendices

Appendix A: Responses to specific questions not addressed in main response

Appendix B: EBM, IEA, CMSP contacts

Appendix C: Select Mandates and Responsibilities defining the need for EBM

Appendix A: Responses to specific questions not addressed in main response

How are funds allocated or reallocated towards these efforts?

- For the past several years, the IEA program has participated in NOAA's budget process to request designated funds for the effort. In FY10 we received our first dedicated funding of \$1M. In FY11 we were successfully included in the President's budget and in the House and Senate markups for a significant increase which would have enabled significant progress towards program development in particularly the California Current region, but also some work in the Gulf of Mexico and Northeast Shelf regions. Due to the continuing resolution we have not received these funds, nor is it clear if we will receive them, or any in the following fiscal year. In the meantime there is no reallocation of funds from other efforts, as IEAs need to leverage information from those efforts to incorporate in ecosystem models and analyses (e.g. stock assessments; habitat assessments). What progress has been made to date is through primarily in-kind contributions of staff working on components of the IEA process as they are able. IEAs are also able to leverage progress made from other efforts working on various aspects of ecosystem process research and ecosystem model development. The FY11 request has been resubmitted as part of the FY12 President's budget. We will continue to participate in the NOAA budget process and leverage other related activities as appropriate until the IEA program is fully funded to support all eight regions.
- CMSP – CMSP is included in the President's FY11 budget request at \$6.77M for the Program's activities to develop internal and external capacity for data integration and decision support tool development and to support CMSP in the regions, and at \$20M for competitive grants to Regional Ocean Partnerships (including all NOP 9 priority objectives, with an emphasis on CMSP). Regardless of the ultimate outcome of the FY11 budget process, NOAA continues to pursue a variety of existing efforts that will advance the goals of CMSP within and beyond the agency. The same request is part of the FY12 President's Budget.

What kinds of products can be expected and on what timeline?

- The IEA program is expected to deliver a variety of products that will be of benefit to stakeholders and managers for decision-support as well as to the general public related to the current and predicted status of each regional ecosystem. Products will also vary in terms of the spatial scope – principally as relates to the scale of the management questions being addressed. Timeline for delivery of these products is variable depending on state of development of the regional program(s) and importantly on the level of budget as well as timing of receipt of funds. We had expected to be able to produce some form of product by the end of FY11, however this is now delayed and is pending Congressional budget decisions. Products will range from annual regional ecosystem assessments and/ or status reports; online web-based decision support tools and information for managers and stakeholders; informational brochures and handouts; IEA process guidance documents; peer-reviewed literature.

- CMSP -- In the near-term, NOAA's CMSP program will continue to: develop a structure, processes and capacity to advance CMSP internally and among our partners; support the National and Regional CMSP Workshops; contribute to the CMSP Strategic Action Plan and Guidance; develop a prototype National Information Management System and Data Portal during FY11; strengthen data integration and fill critical knowledge gaps for CMSP; and coordinate regional planning bodies. Longer-term actions and deliverables will be guided by the NOP and CMSP Framework but ultimately depend upon funding levels.

How is research planned in support of EAM?

- There is considerable research into the fundamentals of ecosystem science and process both throughout the agency as well as in other federal agencies, academia, and with international partners. Within NOAA, the Next Generation Strategic Plan has defined a very clear enterprise level objective for achieving a holistic understanding of the Earth system through research. It is recognized that our long-term goals and objectives hinge on innovative research and through this objective will be moved forward based on activities and efforts defined through the NOAA planning process (SEE). This priority will take into account the interrelationships that exist across our climate, weather, ocean, and coastal domains and is meant to improve understanding of the of Earth system spanning global to local scales, including new efforts in social science. There are a number of relevant and non-mutually exclusive "evidences of progress" across this enterprise objective. However there two in particular that are explicit in stating research needs for EBM. One calls for improved understanding of ecosystems and the effects of human activities on the ecosystem and coastal communities and economies; and the other calling for research on ecosystem impacts, processes, dynamics and biodiversity to be transitioned to enable ecosystem approaches to management and coastal community resilience. The other evidences even if not stated explicitly will also support research needed for EBM. Research is also an important component of the four long-term goals' implementation plans (i.e. Healthy Oceans; Climate Adaptation and Mitigation; Weather Ready Nation, and Resilient Coastal Communities and Economies), and the priorities and activities defined in each will be coordinated as appropriate through the enterprise objective.

How is NOAA developing performance measures for EAM, e.g., through evaluation and revision of IEAs?

- For every NOAA program that has, or will have, a budget, we are required to develop outcome-based corporate performance measures relative to budget received that show our progress in development and execution of these programs. We are required to report on progress quarterly, and in particular at the end of each fiscal year. This extends to programs such as IEAs and CMSP.
- For each NGSP long-term goal and enterprise objectives there are a suite of NGSP evidences of progress – through NOAA's planning and programming process (SEE) these evidences have been translated and mapped to NOAA activities, outputs, and

outcomes that are anticipated to enable delivery on those evidences of progress. Within the implementation plans, the corporate performance measures within each line office that will help manifest progress are linked to the activities, outputs, and outcomes and thus ultimately the evidence of progress. IEAs and CMSP will have activities, outputs, and outcomes that help achieve the evidences of progress in meeting our long-term goals and objectives for EBM.

- The IEA process itself has a monitoring and evaluation step built in that enables said monitoring and evaluation of the performance of the selected/ implemented management action to achieve a desired outcome relative to forecasted ecosystem response to that action. Based on this analysis, management can be adapted, through the IEA process, to try to better achieve the management goal.

How is the development of the Integrated Ocean Observing System seen as supporting EAM?

- Ocean, coastal, and in general earth observations are of critical importance to successful and robust EBM. For example, the IEA program will rely on available observing system capacity for data and information for development and testing of indicators and running of ecosystem models. Thus the development of IOOS nationally (Federal contributions) and regionally (Regional Associations) provides a critical and foundational support for both IEAs and CMSP.

What is the relationship between the Climate Goal Team and the Ecosystem Goal Team when assessing ecosystem change?

- Since the last meeting of the ESMWG that generated these questions, the Ecosystem Goal Team and Climate Goal Team no longer exist. However, through the NGSP we now have three corresponding long-term goals: Climate Adaptation and Mitigation, Healthy Oceans, and Resilient Coastal Communities and Economies. It goes without saying that any ecosystem-based approaches to management that inherently consider impacts of environmental variability MUST consider climate change. Thus across these goals there is cross reference for the need for NOAA's climate work to support the ecosystem-based management goals and activities and for those goals and activities to work with those conducting our climate work to ensure useful contribution to analysis of ecosystem impacts of climate change. In each of the goals there are either objectives or evidences of progress that point to a need to support each other. For example: within Healthy Oceans there is an NGSP evidence of progress that specifies increased development and use of climate considerations in fishery and protected resources decisions and in coastal and marine spatial planning processes; in the Coastal Communities Goal and objective that states resilient coastal communities that can adapt to the impacts of hazards and climate change; and in the Climate Adaptation Goal an evidence of progress that stipulates national and regional assessments address particular needs of NOAA's unique stewardship responsibilities for ocean and coastal ecosystems, living marine, and water

resources. As the agency moves forward with implementation of these plans we will need to be vigilant in the continued coordination and communication of these efforts.

Appendix B: EBM, IEA, and CMSP contacts

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Appendix C: Select Mandates and Responsibilities defining the need for EBM

Executive Order and Corresponding National Ocean Policy

- “To succeed in protecting the oceans, coasts, and Great Lakes, the United States needs to act within a unifying framework under a clear national policy, **including a comprehensive, ecosystem-based framework** for the long-term conservation of our resources.”

Magnuson-Stevens Fishery Conservation and Management Act

- call to expand the application of **ecosystem principles in fishery conservation and management** activities

Endangered Species Act

- provide a means whereby the **ecosystems** upon which endangered species and threatened species depend **may be conserved**

National Environmental Policy Act

- plans and actions at local, tribal, State, regional, and **ecosystem-based levels** to achieve the goals and objectives

Coastal Zone Management Act –

- development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone, **giving full consideration to ecological, cultural, historic, and esthetic values** as well as the needs for compatible economic development
- assistance to support **comprehensive planning, conservation, and management for living marine resources**, including planning for the siting of pollution control and aquaculture facilities within the coastal zone, and improved coordination between State and Federal coastal zone management agencies and State and wildlife agencies

National Marine Sanctuaries Act

- provide authority for comprehensive and coordinated protection, conservation, and adaptive management of the System, and the activities there in affecting the System, in a manner that supports **ecosystem-based management** and recognizes existing regulatory authorities and uncertainties in our scientific understanding of the marine environment

The Marine Mammal Protection Act

- they should be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management and that the primary objective of **their management should be to maintain the health and stability of the marine ecosystem.**

Coral Reef Conservation Act

- utilize were application watershed-based or **ecosystem-based approaches**

Executive Order 13158 on MPAs

- calls for a comprehensive, ecosystem-based national system of MPAs
- directs federal agencies to work with external partners to assess resources, threats and gaps in protection, and to expand and strengthen the system to meet those needs
- calls for integrated, place-based science and analysis

NMFS Strategic Plan for Fisheries Research

- status of a fish stock and the merits of alternative harvest strategies cannot be determined in isolation; an **ecosystem-based approach** is needed to take into account the various factors that affect the status of a stock and the importance of a stock to other components of the ecosystem
- Goal 1—provide scientifically sound information and data sufficient to support **ecosystem-based fishery conservation and management**
- Understand and model linkages between habitats, environmental characteristics, and fishery productivity in order to implement **ecosystem-based management**
- through agreed-upon transboundary ministerial actions, constitute the principal assessment and management authorities for recovering depleted fish stocks, restoring degraded habitats, and reducing and controlling coastal pollution through the introduction of **ecosystem-based practices** for sustaining marine resources and their environments

Dynamic Changes in Marine Ecosystems

- Recommendations in this report call for a more comprehensive **ecosystem-based approach to fisheries management**, rather than the species-by-species approach currently being used

A Requirements Plan for Improving the Understanding of the Status of US Protected Marine Species

- this Plan provides a key to the achievement of NOAA Fisheries' primary mission goal under the 2005-2010 Strategic Plan which is to "Protect, Restore and Manage the Use of Coastal and Ocean Resources through **Ecosystem-based Management**."

Habitat Assessment Improvement Plan

- Contribute to **ecosystem-based fishery management (EBFM)**, integrated ecosystem assessments (IEA's), and coastal and marine spatial planning (CMSP).

Marine Fisheries Stock Assessment Improvement Plan

- Next-generation assessments are also envisaged as providing the foundation for **ecosystem-based management**. While considerable work on incorporating ecosystem considerations into assessment models and management advice is currently underway, both within and outside of NMFS, ecosystem science is still in its infancy.